EXERCISES

For more practice, see *Extra Practice*.

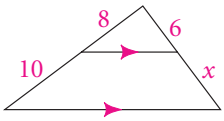
Practice and Problem Solving

A Practice by Example

Example 1 (page 447)

Algebra Solve for x.

1.



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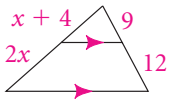

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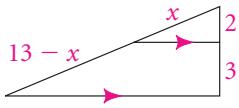
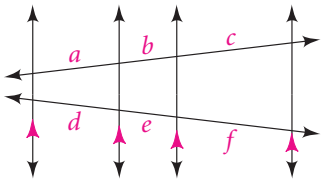


Example 2 (page 447)

Use the figure at the right to complete each proportion.



4. $\frac{a}{b} = \frac{\square}{e}$

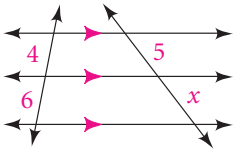
5. $\frac{b}{\square} = \frac{e}{f}$

6. $\frac{f}{e} = \frac{c}{\square}$

7. $\frac{a}{b + c} = \frac{\square}{e + f}$

Algebra Solve for x.

8.



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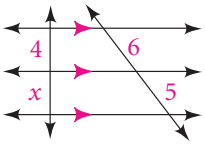

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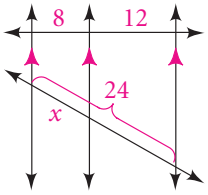
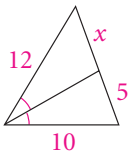


Example 3 (page 448)

Algebra Solve for x.

11.



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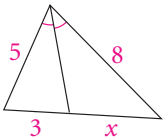

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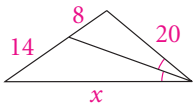

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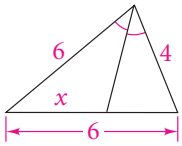

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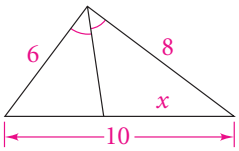

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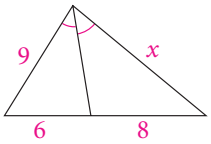
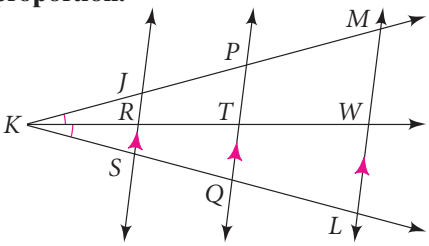


Use the figure at the right to complete each proportion.



17. $\frac{RS}{\square} = \frac{JR}{KJ}$

18. $\frac{KJ}{JP} = \frac{KS}{\square}$

19. $\frac{QL}{PM} = \frac{SQ}{\square}$

20. $\frac{PT}{\square} = \frac{TQ}{KQ}$

21. $\frac{KL}{LW} = \frac{\square}{MW}$

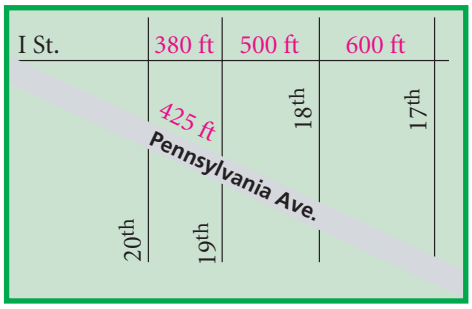
22. $\frac{\square}{KP} = \frac{LQ}{KQ}$

23. $\frac{\square}{SQ} = \frac{JK}{KS}$

24. $\frac{KL}{KM} = \frac{\square}{MW}$

B Apply Your Skills

Urban Design **In Washington, D.C., 17th, 18th, 19th, and 20th Streets are parallel streets that intersect Pennsylvania Avenue and I St.**



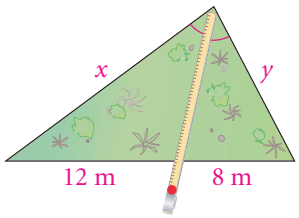
25. How long (to the nearest foot) is Pennsylvania Avenue between 19th Street and 18th Street?

26. How long (to the nearest foot) is Pennsylvania Avenue between 18th Street and 17th Street?

27. The legs of a right triangle are 5 cm and 12 cm long. Find the lengths, to the nearest tenth, of the segments into which the bisector of the right angle divides the hypotenuse.

28. **Open-Ended** In a triangle, the bisector of an angle divides the opposite side into two segments with lengths 6 cm and 9 cm. How long could the other two sides of the triangle be? (*Caution:* Make sure the three sides satisfy the Triangle Inequality Theorem.)

29. **Surveying** The perimeter of the triangular lot at the right is 50 m. The surveyor's tape bisects an angle. Find the lengths x and y.



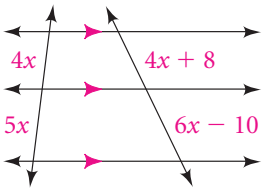
30. **Critical Thinking** Sharell draws $\triangle ABC$. She finds that the bisector of $\angle C$ bisects the opposite side.

a. Sketch $\triangle ABC$ and the bisector.

b. **Writing** What type of triangle is $\triangle ABC$? Explain your reasoning.

Algebra **Solve for x.**

31.



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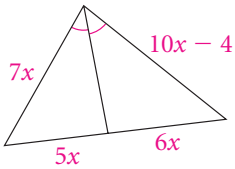

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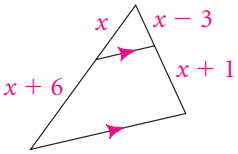
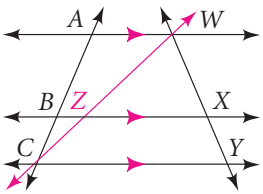


Proof **34.** Follow the steps below. Write a proof of the Corollary to the Side-Splitter Theorem found on page 447.



Given: $\overleftrightarrow{AW} \parallel \overleftrightarrow{BX} \parallel \overleftrightarrow{CY}$

Prove: $\frac{AB}{BC} = \frac{WX}{XY}$

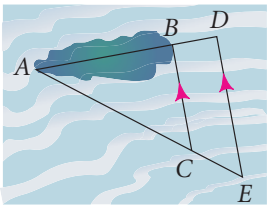
Begin by drawing $\overleftrightarrow{WC}$, intersecting $\overline{BX}$ at point Z.

a. Apply the Side-Splitter Theorem to $\triangle ACW$: $\frac{\square}{\square} = \frac{WZ}{ZC}$.

b. Apply the Side-Splitter Theorem to $\triangle CWY$: $\frac{WZ}{ZC} = \frac{\square}{\square}$.

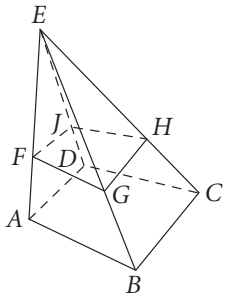
c. Substitute to prove the corollary.

35. Oil Spills Describe how you could use the figure at the right to find the length of the oil spill indirectly. What measurements and calculations would you use?



36. An angle bisector of a triangle divides the opposite side of the triangle into segments 5 cm and 3 cm long. A second side of the triangle is 7.5 cm long. Find all possible lengths for the third side of the triangle.

Geometry in 3 Dimensions **In the figure at the right, $\overleftrightarrow{FG} \parallel \overleftrightarrow{AB}$, $\overleftrightarrow{GH} \parallel \overleftrightarrow{BC}$, $AF = 2$, $FE = 4$, and $BG = 3$.**



37. Find GE.

38. If $EH = 5$, find HC.

39. If $FG = 3$, find the perimeter of $\triangle ABE$.

For a right triangle, denote lengths as follows: ℓ_1 and ℓ_2 the legs, h the hypotenuse, and h_1 and h_2 the hypotenuse segments determined by the bisector of the right angle. For the two given measures, nd the other three to the nearest tenth.

40. $\ell_1 = 6, \ell_2 = 8$

41. $h_1 = 4, h_2 = 9$

42. $h = 13, \ell_2 = 12$

43. $\ell_1 = 5\sqrt{2}, h_1 = 5$

44. $\ell_1 = 15, \ell_2 = 8$

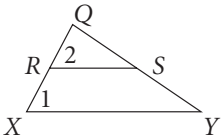
45. $h_1 = 4, h = 8$

Proof **46.** In a 30°-60°-90° right triangle, the right-angle bisector cuts the hypotenuse into two segments. Prove that one segment is $\sqrt{3}$ times the length of the other.

Proof **47.** Copy and complete this two-column proof of the Converse of the Side-Splitter Theorem: If a line divides two sides of a triangle proportionally, then it is parallel to the third side.

Given: $\frac{XR}{RQ} = \frac{YS}{SQ}$

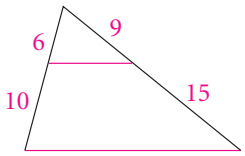
Prove: $\overline{RS} \parallel \overline{XY}$



Statements	Reasons
1. $\frac{XR}{RQ} = \frac{YS}{SQ}$	**a.** ?
2. $\frac{XR + RQ}{RQ} = \frac{YS + SQ}{SQ}$	**b.** ?
3. $\frac{XQ}{RQ} = \frac{YQ}{SQ}$	**c.** ?
4. $\angle Q \cong \angle Q$	**d.** ?
5. $\triangle XQY \sim \triangle RQS$	**e.** ?
6. $\angle 1 \cong \angle 2$	**f.** ?
7. $\overline{RS} \parallel \overline{XY}$	**g.** ?

Determine whether the red segments are parallel. Explain each answer. You can use the theorem proved in Exercise 47.

48.



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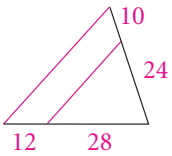

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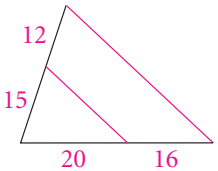


Challenge *Proof* **51.** Use the definition in part (a) to prove the statements in parts (b) and (c).

a. Write a definition for a midsegment of a parallelogram.

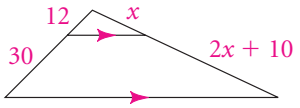
b. A parallelogram midsegment is parallel to two sides of the parallelogram.

c. A parallelogram midsegment bisects the diagonals of a parallelogram.

Standardized Test Prep

Multiple Choice

52. Use the figure at the right. What is x?



A. 5 **B.** 10

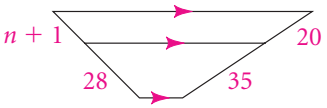
C. 15 **D.** 20

53. The legs of a right triangle have lengths 7 and 24. The bisector of the right angle divides the hypotenuse into two segments. What is the length of the shorter segment of the hypotenuse to the nearest tenth?

F. 5.6 **G.** 8.0 **H.** 19.4 **I.** 25

Short Response

54. What is n? Show your work.



Extended Response

55. The bisectors of an angle of a triangle divide the opposite side of the triangle into segments 4 cm and 5 cm long. A second side of the triangle is 6 cm long.

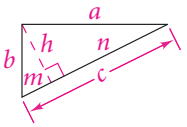
a. Draw two diagrams you can use to find the two possible different lengths for the third side.

b. Use each diagram in part (a) to write a proportion. Solve for each possible length of the third side of the triangle. Show your work.

Take It to the NET
Online lesson quiz at
www.PHSchool.com
Web Code: afa-0805

Mixed Review

Lesson 8-4 **Refer to the figure to complete each proportion.**

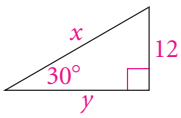


56. $\frac{n}{h} = \frac{h}{\square}$ **57.** $\frac{\square}{b} = \frac{b}{c}$

58. $\frac{n}{a} = \frac{a}{\square}$ **59.** $\frac{m}{h} = \frac{\square}{n}$

Lesson 7-3 x^2 **Algebra** **Find the value of each variable. Leave your answer in simplest radical form.**

60.



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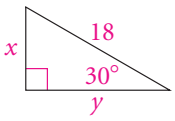

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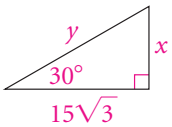

Lesson 6-4 x^2 **Algebra** ***RSTV* is a rectangle. Find the lengths of the diagonals $\overline{RT}$ and $\overline{SV}$.**

63. $RT = 5x + 8, SV = x + 32$ **64.** $RT = 42 - x, SV = 9x - 8$

65. $RT = 8x - 4, SV = 6x + 9$ **66.** $RT = 3x + 5, SV = 5x + 4$